

What is claimed is:

- 1 1. A storage management service system, comprising:
2 a storage on demand (SoD) center system computer;
3 a storage subsystem; and
4 a host computer, said host computer, said storage subsystem, and said SoD
5 center system computer interconnected by a communications network; said host computer
6 comprising a software agent, said software agent providing an interface between said SoD
7 center system computer and an operating system resident on said host computer; and
8 wherein
9 said SoD center system computer receives input of an SoD demand, sends
10 said demand to an SoD resource manager, which manages storage resources of said
11 storage subsystem; and wherein said SoD resource manager receives said demand from
12 said SoD center system computer, and thereupon updates a device management table and
13 an I/O port management table, in which a current status of at least one of a plurality of
14 resources is recorded, and to which said SoD resource manager refers when managing
15 said at least one of a plurality of resources, and sends a management result to the SoD
16 center system computer; and wherein
17 said SoD center system computer receives said management result from
18 said SoD resource manager, and thereupon stores said management result.
- 1 2. The system of claim 1, wherein if said demand requires an I/O path
2 setting to be updated, said SoD center system computer sends an I/O path setting request
3 to said software agent running in said host computer; and wherein said software agent
4 receives said I/O path setting request from said SOD center system computer, and
5 thereupon requests said operating system to update an I/O path setting table based upon
6 said I/O path setting request, and receives an update result from said operating system,
7 and thereupon sends a setting result to said SoD center system computer, and wherein
8 said SoD center system computer receives said setting result from said software agent,
9 and thereupon stores said setting result.
- 1 3. The system of claim 1, wherein said host computer and said storage
2 subsystem are connected directly by physical and logical connections made between at

3 least one of a plurality of host I/O controllers and at least one of a plurality of subsystem
4 I/O ports.

1 4. The system of claim 1, wherein said host computer and said storage
2 subsystem are connected by a network switch between at least one of a plurality of host
3 I/O controllers and at least one of a plurality of subsystem I/O ports.

1 5. The system of claim 4, wherein said network switch comprises a
2 fibre channel network switch.

1 6. A storage apparatus comprising:
2 a memory;
3 at least one of a plurality of devices that store information;
4 at least one of a plurality of I/O ports providing an interface to said at least
5 one of a plurality of devices that store information;
6 a device management table, in which a status of said at least one of a
7 plurality of devices that store information is stored, and an I/O port management table, in
8 which a status of said at least one of a plurality of I/O ports is stored, said device
9 management table and said I/O port management table being disposed in said memory;
10 and
11 a storage resource management processor; wherein
12 said storage management processor receives a demand for storage
13 resources, and thereupon updates said device management table and said I/O port
14 management table, and sends a management result responsive to said demand for storage
15 resources; and wherein updates to at least one of a plurality of paths connecting to storage
16 resources allocated from said at least one of a plurality of devices that store information
17 are automatically defined to an operating system of a user machine by a remotable
18 software agent.

1 7. The apparatus of claim 6, said at least one of a plurality of devices
2 that store information comprising at least one of magnetic disk, an optical disk, a
3 magnetic-optical disk, and a semiconductor memory.

1 8. The apparatus of claim 6, further comprising a communications
2 interface to a network, said storage management processor receiving said demand for
3 storage resources over said network.

1 9. The apparatus of claim 6, further comprising a fibre channel
2 switch, said fibre channel switch providing capability to connect to at least one of a
3 plurality of host computers.

1 10. A method for configuring a host computer to access resources in a
2 removable storage subsystem, said host computer, said removable storage subsystem, and
3 a center system computer interconnected by a communication network, said method
4 comprising:
5 receiving at said host computer an I/O path setting request from said center
6 system computer, said I/O path setting request comprising information about resources in
7 said removable storage subsystem allocated for use by said host computer;
8 requesting an operating system resident in said host computer to update an
9 I/O path setting table based upon said I/O path setting request;
10 receiving an update result from said operating system; and
11 sending a setting result to said center system computer based upon said
12 update result.

1 11. The method of claim 10, wherein updating said I/O path setting
2 table comprises: storing an indication that a particular I/O port in said storage subsystem
3 is accessible to a particular host I/O controller.

1 12. The method of claim 10, further comprising:
2 receiving at said center system computer an input of a demand for storage
3 resources;
4 determining whether sufficient resources exist in order to meet said
5 demand;
6 sending said demand for storage resources to said storage subsystem, if
7 sufficient resources were determined to exist;
8 receiving from said storage subsystem a management result, said
9 management result indicating whether storage resources have been successfully allocated
10 in accordance with said demand;
11 storing said management result;
12 determining whether said demand includes an I/O path setting request;

13 sending said I/O path setting request to said host computer, if said demand
14 included an I/O path setting request;
15 receiving said setting result from said host computer; and
16 storing said setting result.

1 13. The method of claim 12, further comprising:
2 receiving said demand for storage resources at said storage subsystem;
3 determining whether said demand includes a command to make at least
4 one of a plurality of installed devices available;
5 updating a device management table, if said demand includes a command
6 to make at least one of a plurality of installed devices available;
7 updating an I/O port management table; and
8 sending a resource management result to said center computer system.

1 14. The method of claim 13, wherein updating a device management
2 table comprises: storing an indication that a particular device is usable.

1 15. The method of claim 13, wherein updating a I/O port management
2 table comprises: storing an indication that a particular I/O port is usable.

1 16. The method of claim 13, further comprising:
2 receiving at said storage subsystem an I/O command to access storage
3 resources from said host computer;
4 determining whether storage resources requested by said I/O command are
5 usable;
6 performing said I/O command, if said storage resources requested by said
7 I/O command are usable, otherwise rejecting said I/O command; and
8 sending an I/O result to said host computer.

1 17. The method of claim 16, wherein determining whether storage
2 resources requested by said I/O command are usable comprises:
3 searching said device management table to determine whether devices
4 requested in said I/O command are usable.

1 18. The method of claim 17, wherein determining whether storage
2 resources requested by said I/O command are usable further comprises:

3 searching said I/O port management table to determine whether I/O ports
4 requested in said I/O command are usable and whether devices requested in said I/O
5 command are accessible via I/O ports requested in said I/O command.

1 19. A computer program product for configuring a host computer to
2 access resources in a remotable storage subsystem, said host computer, said remotable
3 storage subsystem, and a center system computer interconnected by a communication
4 network, said computer program product comprising:
5 code that receives at said host computer an I/O path setting request from
6 said center system computer, said I/O path setting request comprising information about
7 resources in said remotable storage subsystem allocated for use by said host computer;
8 code that requests an operating system resident in said host computer to
9 update an I/O path setting table based upon said I/O path setting request;
10 code that receives an update result from said operating system;
11 code that sends a setting result to said center system computer based upon
12 said update result; and
13 a computer readable storage medium for holding the codes.

1 20. The computer program product of claim 19, further comprising:
2 code that receives at said center system computer an input of a demand for
3 storage resources;
4 code that determines whether sufficient resources exist in order to meet
5 said demand;
6 code that sends said demand for storage resources to said storage
7 subsystem, if sufficient resources are determined to exist;
8 code that receives from said storage subsystem a management result, said
9 management result indicating whether storage resources have been successfully allocated
10 in accordance with said demand;
11 code that stores said management result;
12 code that determines whether said demand includes an I/O path setting
13 request;
14 code that sends said I/O path setting request to said host computer, if said
15 demand includes an I/O path setting request;
16 code that receives said setting result from said host computer; and

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code that stores said setting result.

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code that stores said setting result.